

*Theory of Mind and Language Development in Deaf Children*

An Honors Thesis (HONR 499)

by

Lauren Settecerri

**Thesis Advisor**  
Dr. Azar Hadadian

Ball State University  
Muncie, Indiana

May 2015

**Expected Date of Graduation**

May 2015

Und grad  
Thesis  
LD  
2489  
24  
2015  
548

## Abstract

A term commonly used within the realm of Autism Spectrum Disorders, theory of mind (ToM) has recently been found to have connections with the deaf and hard of hearing community, and especially among school-aged children. Furthermore, researchers have discovered that the development of a deaf child's theory of mind has a direct correlation with their exposure to language at an early age, and often the language method of their primary caregivers. Deaf children born to deaf parents who have early access to American Sign Language have been found to perform better on theory of mind assessments due to their ability to communicate with family members about mental states and other more abstract concepts. This thesis explores how language development in children who are deaf affects the development of a theory of mind. In addition, the second part of this paper includes classroom activities and instructional ideas to assist teachers in the promotion of the development of theory of mind in deaf and hard of hearing children.

## **Acknowledgements**

First of all, I would like to thank my family and friends for their support and encouragement throughout my educational career and time at Ball State University.

Without them, I wouldn't have been motivated to pursue opportunities such as enrolling in the Honors College and completing my research in an area that I am so passionate about.

I would also like to thank Dr. Jennifer Wolfe, for her support and guidance as my professor in my studies in Deaf Education, and from which many of the inspirations for this thesis stem.

A special thanks goes to my thesis advisor, Dr. Azar Hadadian, for her guidance and wisdom through the creation of this project and her willingness to offer suggestions throughout the process. She has been a wonderful mentor during my education at Ball State, and a provider of excellent advice, encouragement, and assistance.

Finally, I would like to thank the rest of my professors and colleagues at Ball State University for helping to make my undergraduate journey one that I will forever cherish.

## **Part I: Theory of Mind and Language Development in Deaf Children**

Perhaps even more important than the language used within a communication exchange is the ability of the participants to have an understanding of what the other is thinking and feeling. Known as theory of mind, this term is defined as “...the ability to understand that other people have mental states (thoughts, desires, beliefs) that may be different from one’s own” (Woolfe, Want, Siegal, 2002, p. 768). In fact, understanding the false beliefs of others is a vital aspect in a child’s cognitive development (p. 768). Baren-Cohen, Tager-Flusberg, and Cohen (2000) describe theory of mind as a tool to understand the behavior of self and others, and argue that it is ““...one of the quintessential abilities that makes us human”” (p.3). As Peterson explained, being able to understand the mental states of others is a powerful skill for communication and is an ability that separates our race from other intelligent beings in nature.

Carol Miller describes the relationship between theory of mind and language as an “interdependence”, in which a developed theory of mind is essential for communication (2006, p. 142). For example, with a theory of mind, one is able to judge another’s needs and wants for information (p. 142). In addition, because mental states such as our personal thoughts and opinions are unobservable, language provides an avenue to learn the meanings of words such as “think”, “like”, and “want” (p. 145). At a young age, children are developing theory of mind through precursors such as joint attention, recognizing that people have different perspectives, and pretend play (p. 143). As children grow older, the steps toward development of theory of mind become even more important in their communication with peers. For example, a child would learn that not



everyone likes the same things, and can therefore avoid conversing with a peer about a subject that would be disinteresting to them. In a child with an underdeveloped theory of mind, not being able to recognize when the other person is ready to leave a conversation could detrimentally affect the child's ability to socialize and feel a sense of belonging with peers. Just as theory of mind is developed through communication and language, the social implications from an immature theory of mind can further delay progress if a child does not have access to regular communication with his or her peers.

Theory of mind is typically assessed through false-belief tasks with stories or images depicting a situation that requires the examinee to predict what the character will think or do. For example, Woolfe, Want, and Siegal's 2002 study included a task where children saw a picture of a boy that was fishing and hooked a boot. The children had to identify what the boy actually thought was on the line: a hat, a wheel, a fish, or a boot (p. 770). If the child has a developed theory of mind, he or she would choose fish, because that is what the boy would expect to see when he reels in the line. However, those that do not have the higher-level mental state understanding would answer boot, because that is what they saw in the picture. Another way that one's theory of mind is evaluated is through a task called diverse desires. Marschark and Hauser used this task in their 2008 study to "go beyond" the typical false-belief tasks and explore further dimensions within their participants' theory of mind. For this task, children were told that a doll prefers carrots rather than cookies. The child had to identify the item that the doll would choose if presented with both a carrot and a cookie. In order to answer the question correctly, "...the child must disregard his own preferences for the cookie and consider the doll's desires, that is, understand that the doll will behave according to her own preferences" (p.

107). Lastly, the most difficult assessment for participants in this particular study was the hidden emotion task. Not only did the children need to have the understanding that people can hide their actual emotions, but they had to deduce from a story and image that the character was not showing what they were actually feeling (p. 107). These tasks serve as a way to better understand how the child thinks, and if they are able to reason abstractly to make predictions and determine the outcome of unexpected or inexplicit scenarios.

A concept commonly associated among children with Autism Spectrum Disorder, researchers have recently found similar applications of theory of mind delays when looking at the development of deaf and hard of hearing children. In fact, many researchers, including Marschark and Hauser, have found a correlation between the language development of deaf children and their development of theory of mind. They explain this connection in their 2008 study, "...this will be one of the likely reasons for deaf children's delay in ToM development- because they often are constrained in their interpersonal exchanges unless they have early access to an effective language" (p. 103). Because deaf children do not have the same abilities as hearing children to incidentally learn through overhearing everyday conversation, they are unable to pick up on the language and social subtleties used in these exchanges. In addition, a deaf child's lack of an accessible language at a young age can hinder their achievement of mental state understanding. Schick describes this common misconception of social interaction opportunities versus access to language, "...people think that you just need a socially and cognitively nourishing environment to develop theory of mind, but language plays a huge role in this development" (2007, p. 376). Understanding how deaf children develop

language and the environment in which the language was learned will indicate a child's ability and potential for a matured theory of mind.

Language is arguably the most vital aspect of a child's overall development. Without language, children are not able to express their own thoughts, beliefs, and feelings, let alone learn and be able to predict the mental states of other people. For deaf children, this development process can be considerably more challenging, especially without the benefit of an accessible, natural language from a young age. According to the National Institute on Deafness and Other Communication Disorders (NIDCD), more than 90 percent of deaf children are born to hearing parents (NIDCD, 2014). Without the ability to hear the spoken language of their parents from birth, these deaf children's "...early vocabularies [are] acquired from (hearing) parents who may not have been able to communicate fluently with them and thus [may be] delayed or incomplete" (Marschark & Hauser, 2012, p. 41). Hearing parents seem to face multiple obstacles in the raising of deaf children such as, "...feeling inadequate in rearing a deaf child, and the absence of communicative skills in a shared language" (M. & E. Hjelmquist, p. 85). Although parents may want to share information with their young children and involve them in family communication, the language barriers related to hearing loss make this task difficult for parents not familiar with sign language or other pre-lingual communication techniques. In addition, even with access to early intervention, "deaf children typically fall in the bottom 25% of the range of "normal" language development compared to hearing peers" (p. 40). Without the convenience of being around fluent language models both at home and in public, these children are not able to develop their language at a rate similar to hearing peers.

On the other hand, deaf children of deaf parents who have exposure to sign language at a young age “...pass various milestones of language development in the same order and at the same rate as hearing children if not faster, at least early on” (Marschark & Hauser, 2012, p. 41). These deaf children not only have access to social interaction, but the child’s “...parents are able to offer their deaf children greater support for literacy (reading and writing) and cognitive development as well as for language development” (p. 41). In fact, these deaf children are able to develop theory of mind in a similar manner to hearing children because of their ability to “...share their thoughts and feelings with the people in their social environment via conversations in their common native language (signing) from which they benefit from early infancy (Levrez, Bourdin, Le Driant, Forgeot, and Vandromme, 2012, p. 68). Similar to Schick’s statement about the importance of language in developing a theory of mind, Levrez *et al.* argue, “... social interactions are critical for acquiring the ability to make attributions of mental state” (2012, p. 68). The early access to language that deaf children born of signing deaf parents receive is essential in their increased capability of developing mental state understanding and theory of mind.

In 2007, Schick, de Villiers, and de Villiers conducted a false-belief study on three groups of deaf and hard of hearing children with differing linguistic backgrounds, as well as a group of hearing children. The three groups of deaf and hard of hearing children included deaf children born to deaf parents who use ASL, deaf children using ASL born to hearing parents, and deaf children using oral communication born to hearing parents. The children, aged four to eight, were given a series of tests measuring their nonverbal intelligence, false-belief reasoning, and language abilities (p. 384-385). Some

of the false-belief tasks that older aged children were asked to respond to were narratives including an unseen change-in-location and a container with unexpected contents inside. For the younger children, they participated in the hidden sticker game and the surprise face game, where they identified whether the main character would be surprised or not after being read a story.

After reviewing the results of their studies, Schick, de Villiers, and de Villiers discovered that there was little difference in the overall scores of the hearing control group and the native-signing deaf children who had deaf parents. However, both groups performed significantly better than both groups of deaf children with hearing parents, those who used ASL to communicate and those who used oral communication (2007, p. 387). The results from this study showed that language played a significant role in the performance of all subjects on false-belief tasks, and the language background and method also was significant to the differences in scores. For example, the almost equivalent scores between the hearing children and the native-signing deaf children of deaf parents showed the importance of early acquisition of language, and the ability of deaf children to develop theory of minds similar to those of their hearing peers. On the other hand, the study also showed the impact of lack of access to language in the results of the late-signing and oral communication deaf children.

But, by age 7, "... the ASL-DoH (Deaf of Hearing parents) children who now had several years of exposure to intensive ASL appeared to be catching up with the native signers, falling between the ASL-DoD (Deaf of Deaf parents) and the Oral-DoH group..." (p. 388). Although it took a few years, once the deaf children became more familiar with language and learned deeper structure, they were able to perform better on

the false-belief tasks. These children still hadn't surpassed the performance of the native-signing deaf children, but made improvements with progress in language. This increase in theory of mind development among older children corresponds with Russell, Hosie, Gray, Scott, and Hunter's (1998) study that showed age-related improvement in deaf children's false belief test performance. In fact, Russell *et al.* (1998) cite Peterson's and Siegal's (1995) statement that deaf children "...could suffer enduring handicaps in mental state cognition...", but Russell *et al.* respond to this negativity by stating that their theory is an "...essentially pessimistic prognosis..." (Russell *et al.*, 1998, p. 905). A deaf child's theory of mind development can improve with the acquisition of language over time, and "...it may simply be that it is some years before increased opportunities for learning about mental states aggregate sufficiently to impact upon the deaf child's theory of mind development" (Russell *et al.*, 1998, p. 905). Therefore, Russell *et al.*'s (1998) findings offer hope that although some deaf children may experience early delays in theory of mind, it doesn't necessarily mean that these children will have permanent impairments in their theory of mind and mental state understandings (p. 908). In fact, until these deaf children have learned enough language to communicate about mental states, they will not be able to develop their theory of mind in a way that will allow them to succeed in false-belief tasks.

Although hearing children seem to outperform deaf or hard of hearing children in many aspects within false-belief assessments, Rhys-Jones and Ellis found in their 2000 study that deaf children showed better performance in areas requiring use of visual-spatial skills. For example, deaf adolescents (age 11-16) were able to empathize and attribute mental states to characters in picture-sequencing stories. From this evidence, the

researchers concluded that “...deaf and hearing individuals may possess qualitatively different ways of organizing their experiences as a consequence of the lack of oral-aural experience in deaf people” (p. 258). In this case, the deaf individual’s reliance upon their visual-spatial memory instead of the oral dictation of the story helps them to analyze elements of the character’s feelings and thoughts in a different way (p. 259). Because American Sign Language utilizes facial expression and body language as a way to display grammar features and emphasize emotion within a message, the deaf children were able to apply this knowledge to the pictures they were seeing during the test. However, their hearing peers relied on the auditory cues in order to fully understand the mental state of the protagonist (p 259). Although the hearing and deaf children seemed to have developed their theory of mind in different ways, the results are evidence that as deaf children age, they are able to use their language and experiences to comprehend the mental states of others.

Aside from giving parents hope that their deaf children will eventually be able to develop theory of minds similar to their hearing peers through maturation and further acquisition of language, it might be possible to improve a child’s theory of mind through instruction and exposure to mental states (Russel *et al*, 1998, p. 909). Furthermore, the individuals that would have an opportunity to explicitly instruct and encourage theory of mind development would be the classroom teachers of these deaf and hard of hearing children. Because of the important social implications that correspond with a typical developing theory of mind, it would be beneficial for teachers or parents to explore exposing children to and instructing about mental states or false-belief that would assist a deaf child in further developing his or her theory of mind.

Schick's article entitled "Social Cognition and Theory of Mind", written for a program through Hands & Voices established to help families and professionals access resources to educate and raise deaf children, explains both social and academic implications that relate to a child's development of theory of mind. For example, "...children need to learn fundamental principles of sharing, kindness, and solving problems..." and children need mental state understanding and the ability to see the perspectives of others in order to succeed in situations that require solving a problem through compromise (Schick, 2014). In addition to helping in social situations, having a developed theory of mind can also help children in the classroom in areas such as reading. For example, "... skills in social cognition allow a child to understand the perspective of different characters, such as distinguishing the perspectives of Little Red Riding Hood and the wolf". In other areas like history, art, and politics, students are able to make inferences from the thoughts and beliefs of people throughout the ages to understand the impacts of changes such as the Civil Rights movement.

In addition, parents and teachers can help in this development by exposing children to books that include surprise endings or those that allow them to analyze the thoughts and behaviors of the characters within the book. Although there are many ways to directly instruct children about theory of mind, a more natural method includes "...[talking] about feelings, beliefs, values, and thoughts..." and allowing the child to get a glimpse of your mind (Schick, 2014). Just as children are able to acquire language through everyday communication, a similar approach can be used to encourage their development of the understanding of the thoughts and feelings of others. Regardless of the approach used to instill social cognition within a child, the most important aspect of



this development for deaf children is his or her access to language, especially with family members and friends that the child has frequent contact with.

As evidenced by false-belief studies and the analysis of theory of mind capabilities in children, and especially those who are deaf or hard of hearing, it is apparent that there is a direct correlation between the language abilities of an individual and their development of theory of mind. When considering deaf children who have had little access to language in their early years, and consequently have a language delay when compared to hearing peers, it is easy to see how crucial providing opportunities for these children to talk about thoughts, emotions, and beliefs is. Language skills and social interaction remain the primary route in which any child is able to enter the world of complete social awareness through the natural development of theory of mind (van Staden, 2010, p. 103). Therefore, individuals in contact with children who are deaf or hard of hearing are charged with the responsibility of helping to develop these young minds through opportunities for social interaction, which will assist in the progression of theory of mind. As members of our society, these children should be given the tools in order to effectively communicate and interact in our world of complex mental states and social subtleties. Recognizing the need for these children to have intervention in the development of language and theory of mind will undoubtedly ensure that these individuals will grow to become accepted social members and successful communicators.

## **Part II: Classroom Activities and Instructional Ideas for Teaching and Encouraging Theory of Mind Development in Deaf Children**

In preparing for my career as a teacher of the deaf, I have compiled a set of activities that could be used with a range of age groups to help students develop social cognition, mental state understanding, and theory of mind. Below is a list of lessons that I have adapted from curriculums and publications used with children with autism and other disabilities. For each activity, I have listed the materials needed, procedure for implementation, and how it can be differentiated for older or younger children and students who are deaf or hard of hearing.

### **“Name That Feeling”**

Age Range: 5+

Materials:

- Index Cards with Pictured Emotions (confused, excited, sad, angry, bored, worried, happy)

Procedure:

1. The teacher will show the student the flash cards, and the student will sign or say the emotion that fits the pictured image.

### Differentiation

This activity could be better suited for younger students if images were chosen with more basic or fewer emotions such as sad vs. happy or mad vs. excited. Also, students could be

asked to match a pictured sign of the emotion word with the image, or even sort all the “mad” and “excited” images. For older students, they could be asked to provide the written word for the emotion, or be given more complex emotions to decipher such as anxious, shy, or frustrated.

(Jessica Kingsley Publishers, 2014)

## **“Signs and Signals”**

Age Range: 7+

Materials:

- Photo Cards or a group of peers

Procedure:

1. Students will work to identify emotions and non-verbal signals from other people, including posture and body language.

## Differentiation

This activity could be used in a one-on-one setting with cards, or it could be adapted for a group of kids through practicing reading the body language and non-verbal signals of peers that model certain behaviors. I think that this activity would be especially beneficial for deaf children, because of their abilities to pick up on facial expressions due to the nature of ASL. These kids can be taught to relate signs or familiar facial expressions within sign language to common non-verbal signals that they might encounter during conversations in public.

(Ordetx, 2012)

## **“Learning Social Cognition from Storybooks”**

Age Range: Dependent on Reading Level

Possible Books:

- Little Red Riding Hood
- Where’s Spot?
- The Gingerbread Man
- Alexander and the Terrible, Horrible, No Good, Very Bad Day

Procedure:

1. Students and teachers read these books or others related to social cognition and have discussions about character feelings, predict their actions, and learn about the thought processes of others through the stories.

### Differentiation

Where’s Spot is a story that could be used with preschool children to learn about predicting where a hidden object is. This book could be used as an introduction to thinking about where the logical places Spot could be hiding would be. For the older kids, using a book like Alexander and the Terrible, Horrible, No Good, Very Bad Day could help students learn about how negative or positive events can affect our feelings. The value in this activity is having a discussion with the students about the mental states and abstract thinking of the characters within the book, and helping them apply that to their development of theory of mind.

(Schick, 2014)

## **“Sentence Complements”**

Age Range: 7-8+

Materials:

- Examples of sentence complements-

“Lucy thinks the moon is made of green cheese.”

“Tony told Mary that the girl’s basketball team won their game last night.”

“I believe that my brother is looking for a new job.”

Procedure:

1. The teacher will instruct students about the structure of sentence complements through examples. In these sentences, the overall message of the sentence is true, even though part of the sentence may be false. Students will work with sentences that include mental verbs such as “think”, “believe”, and “guess”, and communication verbs like “say” and “tell”.

### Differentiation

For younger students and deaf and hard of hearing students, the sentences can be paired with visual images to help the student understand the language of the sentence and build vocabulary skills. Teachers can also “act out” the sentence using student models or the images to help students recognize the difference between the truth of the whole sentence versus the false embedded sentence. Students can work to identify the true part and false part of the sentence, and teachers could use different colors to signify the different parts of the sentence.

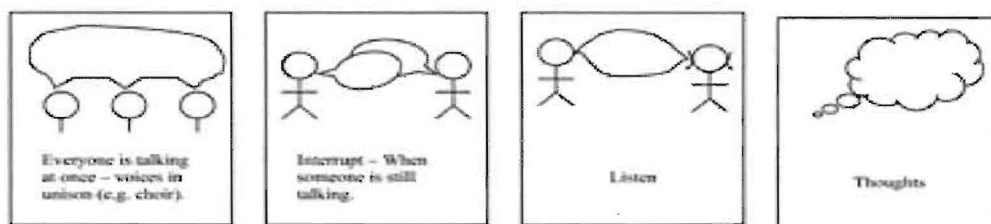
(Miller, 2006)

## “Social Stories”

Age Range: 5+

Materials:

- Teacher-created “Comic Strip Conversations”  
(images containing stick figures describing the levels of communication that take place in a conversation)



Procedure:

1. The teacher will read and model the comic strip images to instruct about social understanding and proper interactions.

### Differentiation

The teacher can differentiate this activity depending on the age and language ability of students through more complex or simplified images or captions. The teacher can also use images of classmates to make the stories more meaningful through having students model the situations and taking pictures during the activity. In addition, for students that need extra support in understanding the emotions of others, the teacher can use Carol Gray’s ‘Conversation Colours’ (pictured below) to help students understand how the characters in the image are feeling in the given situation.

(Gray, 1994)

Green: Good ideas, happy, friendly
Red: Bad ideas, anger, unfriendly
Blue: Sad, uncomfortable
Yellow: Frightened
Black: Facts, truth
Orange: Questions
Brown: Comfortable, cosy
Purple: Proud
Colour combinations: Confusion

## References

- Baron-Cohen, S., Tager-Flusberg, H., & Cohen, D. J. (2000). *Theory of mind and autism: A fifteen year review*. Oxford: Oxford University Press.
- Gray, C. (1994). *Comic strip conversations: Illustrated interactions that teach conversation skills to students with autism and related disorders*. Arlington, Texas: Future Horizons. Retrieved from <http://www.autism.org.uk/living-with-autism/strategies-and-approaches/social-stories-and-comic-strip-conversations/what-is-a-comic-strip-conversation.aspx>
- Jessica Kingsley Publishers. (2014). Teaching theory of mind 'name that feeling' activity. Retrieved from <http://www.jkp.com/jkpblog/wp-content/uploads/2013/10/Ordetx-Teaching-theory-of-mind-pgs-10-14-and-24-27-extract.pdf>
- Levrez, C., Bourdin, B., Le Driant, B., D'Arc, B., Vandromme, L. (2012). The impact of verbal capacity on theory of mind in deaf and hard of hearing children. *American Annals of the Deaf*, 157(1), 66-77.
- Marschark, M., Green, V., Hindmarsh, G., Walker, S. (2000). Understanding theory of mind in children who are deaf. *Journal of Child Psychology and Psychiatry*, 41(8), 1067-1073.
- Marschark, M., & Hauser, P. (2012). *How deaf children learn: What parents and teachers need to know*. New York: Oxford University Press.
- Meristo, M., & Hjelmquist, E. (2009). Executive functions and theory-of-mind among deaf children: Different routes to understanding other minds? *Journal of Cognition and Development*, 10(1-2), 67-91.

- Miller, C. (2006). Developmental relationships between language and theory of mind. *American Journal of Speech-Language Pathology*, 15, 142-154.
- National Institute on Deafness and Other Communication Disorders (NIDCD). (2014). Quick Statistics. Retrieved November 20, 2014, from <http://www.nidcd.nih.gov/health/statistics/pages/quick.aspx>
- Ordetx, K. (2012). *Teaching theory of mind: A curriculum for children with high functioning autism, Asperger's syndrome, and related social challenges*. London: Jessica Kingsley.
- Peterson, C., & Slaughter, V. (2006). Telling the story of theory of mind: Deaf and hearing children's narratives and mental state understanding. *British Journal of Developmental Psychology*, 24, 151-179.
- Rhys-Jones, S., & Ellis, H. (2000). Theory of mind: Deaf and hearing children's comprehension of picture stories and judgments of social situations. *Journal of Deaf Studies and Deaf Education*, 5(3), 248-265.
- Russell, P., Hosie, A., Gray, D., Scott, C., & Hunter, N. (1998). The development of theory of mind in deaf children. *Journal of Child Psychology and Psychiatry*, 39(6), 903-910.
- Schick, B. (2014). Social cognition and theory of mind. Retrieved from <http://www.handsandvoices.org/comcon/articles/pdfs/socCogTheoryMind.pdf>
- Schick, B., de Villiers, P., de Villiers J., & Hoffmeister, R. (2007). Language and theory of mind: A study of deaf children. *Child Development*, 78(2), 376-396.
- van Staden, A. (2010). Comparing native signing, late-signing and orally trained deaf children's 'theory of mind' abilities. *South African Journal of Psychology*, 40(1),



97-106.

Woolfe, T., Want, S., & Siegal, M. (2002). Signposts to development: Theory of mind in deaf children. *Child Development*, 73(3), 768-778.